Discovering Our Own Backyards: The Ecological and Social Contributions of Backyard Wildlife Sanctuaries to the Urban Environment

❖ First Place ❖
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Urban Ecology Undergraduate Team, 2002-2003:
***Ashley Adams**, Conservation of Wildland Resources*
***Heather Anderson**, Community & Environmental Planning*
***Emily Augenstein**, Environmental Studies, Conservation of Wildland Resources*
***Ian Bell**, Wildlife Sciences, Environmental Studies*
***Lisa Cooper**, Community & Environmental Planning, Art*
***Justin Hellier**, Geography*
***Mara Wrede**, Comparative History of Ideas, Geography*

Abstract
As development affects more land area, there is a growing need for research into the ecological functionality of urban residential yards and their ability to play a part in keeping people within the city and discouraging sprawl in the Puget Sound region. We are investigating both the ecological and social services that backyards may be capable of providing. Our research draws from yards registered with the Washington State Department of Fish and Wildlife's Backyard Wildlife Sanctuary Program (BWS) within Seattle city limits. Fifty BWS yards are paired according to size and location with fifty traditionally landscaped yards. We are asking several questions. First, does an aggregate area of BWS display higher plant diversity than an equivalent aggregate area of traditional yards? We are identifying and counting plant species, habitat structures, supplements and human-related activity in each yard. Aggregating the species lists and the area of each type of yard will determine if there is a difference in ecological services between types of backyards. Second, to probe the social contribution of backyards, we are asking if owners of BWS are more satisfied with urban life than owners of traditional yards. With the use of a survey, we are obtaining from the homeowner information on their demographics, yard maintenance regimens, and overall satisfaction with their location. The results of this study will serve as a basis for future research on the value of the BWS program and will have implications for urban planners, urban residents, local governments and developers.

Introduction: Looking to the Smallest, Most Disturbed Patches

> *Ecological gardens must come in many shapes and sizes, from mosaics of small backyards that begin to cumulatively change the fabric of urban neighborhoods to gardens the size of large watersheds in which people harvest timber, grow crops, mine minerals, recreate and contemplate, and build houses and cities.*
>
> ~ Kristina Hill and Bart Johnson, from "Toward Landscape Realism," *Ecology and Design*

Ecosystems with little human impact have historically been seen as the best areas for ecological study. Only a small fraction of ecological research is performed in urban areas (Miller and Hobbs 2002), despite the fact that the planet is increasingly being acknowledged as one of human-dominated landscapes (Vitousek et al. 1997), within which urbanization is a primary driver of environmental change. Urban areas are particularly in need of study.

One of the contemporary problems in restoration ecology and conservation biology has been a question of *patch* size. Essentially, how small can a patch of green space be and still function as habitat for flora and fauna? Private, urban backyards—the smallest, most disturbed patches available for study—have received very little attention in ecological studies. Our project probes these areas by examining the ecological and social contributions of disparate backyard management regimens in the City of Seattle.

Research has shown that restoring fragmented patches within the urban matrix to more suitable habitat areas may be a successful strategy for increasing the diversity of at least some bird species (Marzluff and Ewing 2001). On a broader scale, scientists working for Vancouver's Green Links project have begun to look at backyards as a potential for increasing connectivity in the urban matrix as part of a comprehensive biodiversity strategy (Rudd et al. 2002). More ecological research must be done on urban backyards to determine whether they inevitably act as sinks, or if they can be a useful place to focus efforts at biodiversity conservation.

Research into the social benefits of "nearby nature" is well established, but this literature has dealt mostly with large, public spaces rather than small, private green spaces. Small, forested patches in urban areas have been shown to increase property value and may be correlated with income (Cook and Iverson 2000). In an intriguing and helpful study, Rachel Kaplan (1985) found that even the simple presence of trees can have a dramatic effect on resident satisfaction with the functioning of their neighborhood. Rachel and Stephen Kaplan (1998) have also examined the restorative effect that even relatively small patches of green space can have on urban citizens. Clergeau et al. (2001) have demonstrated that urban residents' preference for at least bird species may act as a driver for conservation efforts. By dealing specifically with urban backyards, we will be studying the only "nature" that is accessible to many residents.

The Washington Department of Fish and Wildlife (WDFW) has established a program to encourage habitat restoration for urban wildlife and native plant species. The Backyard Wildlife Sanctuaries (BWS) program promotes the alteration of residential yard maintenance regimens with the goal of attracting and sustaining wildlife. The application for BWS certification requests an inventory of plants, food, water and shelter for wildlife provided in the yard. Certification is automatically awarded for all submitted applications. WDFW provides informational brochures along with the certification packet. These brochures are designed to educate the homeowner on methods for improving wildlife habitat, attracting and supporting wildlife.

BWS certification is sought out by the homeowner and does not provide any form of monetary compensation or property protections or restrictions. It is, however, a way for urban residents to demonstrate their interest in and support for *in situ* conservation efforts. It is a small step that an individual can take in the face of seemingly insurmountable, global environmental problems. In this sense, **good environmental stewardship must begin in our own backyards**, and this program has been an attempt to teach and practice that ethic. However, the program has been operating for more than 50 years without any research into its effectiveness.

Our research will be analyzing some ecological functions as well as some of the social services provided by urban backyards, both BWS and traditional backyards. The central questions we will investigate are:

1. Does an aggregate area of BWS display higher vegetative/plant diversity than an equivalent aggregate area of traditional (lawn & shrubs) yards?
2. Are owners of BWS more satisfied with urban life than owners of traditional yards?

We have decided to use plant diversity as a proxy for ecological functionality, as habitat suitability is for many species predicated on floral and structural features.

To examine the social aspects of BWS for resident satisfaction with urban life, one of the areas we must study is environmental cognition and place-recognition. Research from the burgeoning field of environmental psychology as well as planning have shown the effect that environmental features may have on a resident's sense of place (Kaplan 1982; Kaplan 1985; Lynch 1984, especially "Sense"; Stea 1982). In this sense, one of our most important scales of examination will be **the scale of the personal experience** (Miller and Hobbs 2002).

Definitions

1. **Backyard Wildlife Sanctuary:** A yard registered under the state's BWS program (described above); we have narrowed this very large pool down to 50 sites.
2. **Traditional Backyard:** In the broadest sense, any backyard that is not registered in the BWS program; our intent is to study a variety of yards that are not managed for the specific goals of the BWS program.
3. **Ecological Services:** For our purposes, we have limited this very broad term to vegetative diversity and structure. These measures can be used to infer about usefulness of the yard for wildlife habitat.
4. **Social Services:** This even broader term is pinned down in our study as place attachment to and use of the backyard. We have amalgamated these measures into the expansive idea of resident satisfaction with urban life.
5. **Backyard:** This term is deceptive in that we are not limiting the study to the yard in the back of the house, but rather any planted part of the parcel that is not a permanent built structure.

Hypotheses and Models

We have made tentative assumptions for each question.

1. Does an aggregate area of BWS display higher plant diversity than an equivalent area of traditional yards?
   We hypothesize that vegetative diversity will be higher in BWS than in traditional yard,s that there will be more native species, and that subsequently the species/area curve of BWS will plateau at a higher level of diversity than traditional yards.

2. Are owners of BWS more satisfied with urban life than owners of traditional yards?
   We hypothesize that residents with BWS yards will tend to be more satisfied with urban life, and to be less likely to move into outlying suburban and exurban areas.

Finally, amalgamating our two questions into a single, synthesized idea, we are comparing the effect that plant diversity and "naturalness" may have on urban residents, and their decisions regarding where to live. Kaplan (1985) and others have shown how beneficial even small amounts of green may be to a city's functioning. With these studies in mind, we are working under the assumption that, within the urban context, resident satisfaction increases as a function of the amount nearby nature—here defined as backyard vegetative diversity.

The Urban Ecology Framework

The University of Washington urban ecology conceptual framework upon which we are building this research project states that **drivers** lead to patterns, **patterns** lead to processes, **processes** lead to changes (as well as feedback to patterns), and these **changes** in turn create new drivers. In our models, the drivers can be seen as backyard management regimens such as the BWS program or the more traditional aesthetic and management approach, a fertilized and well-tended lawn. These human-effected drivers may lead to disparate landscape patterns—in this case, a more "natural" yard, or a more traditional yard. Further, these disparate patterns lead to different processes: creating increased plant diversity, and decreased chemical use for BWS; decreased plant diversity, and increased chemical usage for the more traditional yards. In our model, these processes feedback and create new drivers, such as a person's decision to live in an urban versus suburban area. See *Table 1* for a diagram of our models nested in the urban ecology framework.

Table 1.

	Driver 1	Pattern	Process	Change	Driver 2
(a)	**BWS Program**	"natural"	more plant diversity, less chemical *& water* use	more wildlife	less sprawl pressure
(b)	**Traditional Aesthetics**	"traditional"	less plant diversity, more and chem. *& water* use	less wildlife	more sprawl pressure

Methods

Sample site selection:
100 Yards: 50 BWS and 50 Traditional yards.

Our entire sample sites, both BWS and traditional yards have been drawn from within the city limits in order to hold the study to urban (high human/built density) yards. Zoning has been kept to single family residential (SFR).

From the 762 BWS registered to Seattle addresses in the database provided by WDFW, 538 addresses matched addresses listed in the King County tax parcel database to 99% accuracy or better. We used Arc Geographic Information Systems (ArcGIS) to plot these 538 sites onto a map of all the parcels within the city limits. Of these 538 potential sample sites, we used GIS to randomly select 70 sites—50 to be included as data in our final study, and the extra 20 sites so we will have extras from which to draw in case of site-related difficulties, (e.g. owners don't want to work with us, we can't make contact, the yard has been paved, etc).

In order to select the traditional yards to create the matched pairs, we have created a 2-level buffer ring around each of our 70 BWS sites using GIS—the first at 150 feet from the perimeter of the BWS and the second at 500 feet (Figure 1). Potential paired sites have been drawn from all of the residential parcels that are fully within the buffer-ring. We chose these distances to ensure the matched traditional yards are not immediately next door to the BWS site to avoid 'leakage' of species across the parcel boundary but at the same time hold constant details such as neighborhood character, views, real estate values and zoning. From the potential sites within this buffer-ring, we are visually comparing lot size and building footprint data using GIS to determine which 3 to 5 sites most closely match the lot and yard size of the chosen BWS. Selecting by visual comparison is superior to using a straight numerical percent built/lot size comparison because the latter will not effectively identify comparable **yard** size due to differences in building placement on each lot. We are

Figure 1. 70 Backyard Wildlife Sanctuaries with buffer rings as detail.

choosing significantly more potential traditional yard sample sites than we will study because we anticipate less positive study-participation responses from owners with traditional yards.

After choosing all of our potential paired sites we are proceeding with requesting study participation. We are contacting participating homeowners using the BWS database, which contains owners' names and phone numbers. For the traditional yards we are using the address attribute data from the parcel database and conducting reverse searches for phone numbers on the Internet. If this method proves unsatisfactory, we have information flyers that we will deliver to the selected traditional yard sites, thereby using a face-to-face introduction and request to encourage participation.

Ecological Methods:
We are using teams of two to sample each Backyard Wildlife Sanctuary and traditional yard. At least one member of each team will have had some previous plant identification training or experience. Part of the reason for the first phase of our study to focus on plants is so it will be possible to revisit sites to confirm information if necessary—plants can't fly away. We will record yard characteristics on our field data sheet (Appendix 2).

Upon arrival to the site we will first take a visual survey of the yard. Through this we will be able to get a good feel for what type of plants are represented in the yard and what smaller section of the yard would best represent it as a whole. Before the actual sample site is chosen, a measurement of the percentage of (canopy) cover will be taken using a moose horn. Then having calculated the canopy and having a feel for the yard as a whole, a point will be selected centered on a representation of the overall character of the yard. From this point a circle, 24.6 ft in diameter, will be created and act as the yard sample.

We will determine plant genus, and if possible, species, with the assistance of plant identification books (Pojar's *Plants of the Pacific Northwest Coast*, and Trelease's *Winter Botany*, for example) and a plant key. If a species or genus cannot be determined in the field we will call the plant unknown #n and take a digital picture of it for later identification and to determine if the same plant appears in another yard. In addition, we will record the number and percent cover of each species within the sample plot.

We will also identify, characterize and count both man-made and natural habitat structures and supplements including snags, stumps, dead wood, water sources (e.g. ponds, bird baths, etc), feeders and houses. The size measurements of snags and stumps will be recorded as diameter at breast height (DBH) as well as their state of decay. Dead wood will also be measured in the same fashion, but instead of determining height we will record the length of the wood. The identification and characterization of habitat structures is in preparation for the next phase of our study, in which we will correlate the data from this first phase with bird data collected by the WDFW over the past 10 years. We will also record mammals seen on site and human-related activity in each yard such as barbeque equipment, wood-working equipment, children's play equipment, sitting benches and so on.

Sociological Methods:
The basis of our sociological data collection will be a survey questionnaire (Appendix 1), which seeks to describe the varying interactions of urban residents with their backyards, as well as the effect that backyards may have on housing decisions. Preliminary visual assessment of the distribution of all 538 confirmed BWS indicate that with the exception of the downtown, high-rise residential and industrial sections of the city.

On a preliminary level, questions regarding ownership indicate permanence and place attachment. **Historical** questions will help us identify potentially confounding issues and well as adding to the permanence data and setting up background on the **housing choices.** The last series of questions in combination with questions on **maintenance regimens** speaks directly to our most basic research questions. Questions on **yard maintenance and animals,** as well as the question about children will help us determine whether maintenance regimens are distinctly different in the two types of yards or if there is a maintenance-style continuum. We anticipate the questions about children and animals will help us explain some of the differences in yard maintenance as well as directly relate to the bird/insect data for the next potential phases of our study.

We are also asking for specific lists of plants and animals seen within the residents' yards. If we are able to obtain this, we will have one more cross-reference to our own data collection, as well as a preliminary list for the second phase (in regard to animals sighted). We will also be able to report correlation/non-correlation to the WDFW-provided 'expected' species lists included in the BWS-registrars information packet.

We will deliver the survey to the resident when we arrive to conduct the vegetative data collection with the request that they answer it while we are outdoors and to ask us if they have any questions. We will collect the surveys as we leave. If the resident cannot answer the survey during our visit, we will leave a stamped Urban Ecology addressed envelope with the resident so the survey can be returned to us. We will maintain a list of unfinished surveys in order to call the residents in question with reminders. If we have not received the surveys within one week, we will set up appointments to pick up completed surveys in person.

Analyses:
We will perform a variety of statistical analyses with the information from our ecological and social surveys. By aggregating both the species lists and the area of each type of yard we should be able to determine if aggregate BWS are more diverse than aggregate traditional backyards of equal total size. In addition we will do the same sort of analysis for native plant diversity in relation to aggregate area. We will also correlate the information we receive from the social survey to the ecological data. We should be able to determine whether there is a difference in the ecological condition (specifically, plant diversity) due to maintenance regimens and/or human activity on site.

Using the King County/Seattle parks GIS database, we will include edge-to-edge distance measurements for all of our sites to identify and account for any possibly confounding "bleed-over" from the former. This will be more important for a continuation of this study.

Much of the data from the survey will be qualitative, and the patterns will take time and care to discover. We will also be able to test for a correlation between resident satisfaction and the diversity of plant species as well as habitat suitability.

Our Expectations: Connectivity in the Urban Matrix

Our models and hypotheses have laid out what we expect to see in the course of our research and analysis. However, more can be said about the implications of our research if our findings are as predicted. Essentially, we expect to find through our ecological research that there is more diversity (greater total numbers) of both plant and animal species in registered BWS yards.

Recent research has found that backyards may play a vital role in creating connected corridors between fragments of suitable habitat area in the otherwise inhospitable urban matrix (Rudd et al. 2002). We expect our research to expand on this idea by providing concrete evidence that BWS increases vegetative diversity, especially adept at native plant propagation, and that they may provide more suitable structural habitat features. We also expect that BWS in areas with higher densities of BWS will display higher vegetative diversity. In this way, BWS may play an important role in any urban biodiversity conservation strategy.

We also expect to gain some perspective on the relationship between urban residents and, to borrow a phrase from Sara Stein, "the ecology of our own backyards." It is our assumption that the quality of the nearby natural environment,

including integrity of ecological services and vegetative diversity, may serve as one of the factors that keep people within urban growth areas, rather than moving outside the urban growth boundary.

Limitations

We expect that the costs of maintaining a BWS (purchasing native plants, etc) may be prohibitive to lower-income and minority residents. This introduces a key vector for bias and error to enter our study. The best we can do to minimize this risk is to record demographic and property value information as thoroughly as possible, in order to acknowledge any potential bias we find.

Our preliminary analysis of total site distribution indicates, in opposition to our initial concern, that neighborhood economic conditions and property values are not hindrances to participation in the BWS program. We suggest that future research should consider higher-density, multi-family zonations and rental residents to determine if this bears out in other demographic groups.

Pilot Study Findings

We have a sample three of the BWS we are including in our study. The preliminary findings have provided us with some very interesting data in the number of plants present in these yards.

In the first yard very few plants were noted. The yard was small; mostly grass with a few plants around the perimeter and a large cherry tree in the corner. An empty bird feeder was noted, as well as one small birdhouse. There appeared to be few practices used to encourage wildlife. This yard appeared to be more along the lines of our expectations of a traditional backyard.

The second yard contained larger garden beds and more plant material surrounding the grass. Woody debris was left for wildlife and the yard had a somewhat unkempt appearance. A few native plants were used and stumps and snags were left to decay. The homeowner related that there had been a time when neighbors complained about her gardening practices, but as soon as she put up the sign from the Backyard Wildlife Sanctuary program the neighbors left her alone.

The third garden was the most interesting. Throughout this yard there were signs of wildlife habitat. There was no lawn, only garden beds with many plants. In a 50-foot diameter area more than 50 plant species were observed. Many of these plants were native to the area, specifically planted to encourage wildlife. Numerous birdfeeders and birdhouses were included in the landscape. A large 40-foot snag was observed with birds perching and feeding. A small, slow-moving pond was part of the yard. This yard also was adjacent to an overgrown thicket of trees that increased habitat for wildlife. The homeowner has seen many birds including hawks in her yard.

From this preliminary sampling we have been able to see a wide range of yards designated as Backyard Wildlife Sanctuaries. It is unclear why there are these differences. With further study we will be able to determine if age of a BWS has any part to play into the quality of these yards. Other factors may include who started the BWS, personal preferences of the homeowner, and why they have the BWS in the first place.

Our preliminary site visits also allowed us to refine our site sampling methods.

Potentials for Future Research

Vegetative composition and structure is an important component of suitable habitat, but looking at flora alone gives only a limited picture of the BWS program. A generous grant from the WDFW has given us an opportunity to explore already extant avian data. We recently received winter bird count data from WDFW. We are determining how we can most effectively analyze it in relation to our larger study design. We have also asked WDFW to let us know if they have specific analysis goals in mind. Neither of these data sets will require onsite visits for preliminary analysis. Our first step will be to determine whether the sites for the bird data include all or most of our previously randomly selected BWS (Backyard Wildlife Sanctuaries) and TB (traditional backyards). We will correlate the analysis of these data sets with the onsite vegetation and homeowner satisfaction data once we have collected the latter two pieces. In addition, we may have the ability to study pollinators in BWS and traditional yards and to look at the water-usage between the two types of yards. Each of these measures would be important to knowing the ecological contribution of BWS to urban areas.

Discovering our Own Backyards: "Conservation Where People Live and Work"

To urban residents, conservation is too often an effort to save remote locations and pristine landscapes (Miller and Hobbs 2002). We feel that responsible environmental citizenship must begin at the local level, and that any comprehensive conservation strategy must involve not only urban areas, but also operate at the individual scale of the personal experience.

The BWS program is a potentially helpful catalyst to achieve these aims. If the specificities of the management regimens promote native plant growth, greater vegetative diversity, and a great connection to place, as we expect, then the possibilities for creating green cities and environmentally conscious populations are heartening. If backyards may serve as the stepping-stones in broader, city- and region-wide connectivity corridors, then the actions of each individual in their own home may contribute in meaningful ways to the protection of our environment. Linking the fragile and fragmented patches that surround us may well be an important step to bridging the divide between our actions and our planet.

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Appendix 1: Subject Survey

BACKYARD BENEFITS SURVEY

ID# _____

Please answer the following questions as completely as possible. You are welcome to continue your answers on the reverse side of the page.

1. Is your yard a registered Backyard Wildlife Sanctuary? [ ] Yes [ ] No

2. Are you an adult (> 18 years of age)?
   [ ] Yes [ ] No, [ ] Male [ ] Female

3. How many adults and children reside in your household?
   Adults:_____ Children:_____

4. How long have you lived in this neighborhood?
   [ ] Under a year [ ] 1-5 years [ ] 6-10 years [ ] 11+ years

5. Where did you grow up? [ ] rural [ ] suburban [ ] urban

6. Who is the primary caretaker of your yard?
   [ ] You [ ] Other member of household [ ] Non-household member

7. How many hours a week do members of your household spend in the backyard?
   [ ] 0-1 [ ] 2-3 [ ] 4-5 [ ] 6-7 [ ] 8+

8. How many hours a week does the primary caretaker work on your yard?
   [ ] 0-1 [ ] 2-3 [ ] 4-5 [ ] 6-7 [ ] 8+

9. While you were growing up, did your household have a yard?
   [ ] Yes [ ] No

10. Have you made any significant alterations to your yard? [ ] Yes [ ] No
    If yes, what?_____
    When was the work completed?_____
    By: [ ] yourself [ ] family member [ ] contractor [ ] other: _____

11. Does having a yard affect your decision to live in a house instead of a condo or an apartment?
    [ ] Yes [ ] No
    In what way?_____

12. Are you considering moving from this house? [ ] Yes [ ] No
    Why?_____ How soon?_____

13. Do you/caretaker use chemicals in your yard (check all that apply)?
    [ ] Fertilizer [ ] Herbicide [ ] Pesticide [ ] None
    List the brands/types (if known):_____
    _____
    How closely are the application recommendations on the products followed?
    [ ] Use more [ ] Follow exactly [ ] Use less [ ] Don't know

14. How often do you/caretaker mow?
    [ ] Every week [ ] Twice a month [ ] Once a month [ ] Less
    What do you/caretaker do with cut grass? _____

15. Do you/caretaker compost? [ ] Yes [ ] No
    If yes, [ ] On-site [ ] Seattle Public Utilities green recycle program [ ] Both

16. Do you/caretaker prune your shrubs and trees and/or 'deadhead' non-woody plants? [ ] Yes [ ] No
    If yes, why? [ ] Remove of diseased/damaged parts [ ] For shape
    [ ] Increase fruit/bloom [ ] Other_____

17. Do you water the plants in your yard? [ ] Yes [ ] No
    If yes, with what method? [ ] Sprinklers [ ] Soaker hose
    [ ] Watering can [ ] Other_____
    How frequently, and how long each time?_____
    _____

18. Do you water different sections of your yard on different schedules/different amounts (e.g. lawn, perennial beds, annuals/vegetables, woody plants)?
    [ ] Yes [ ] No
    If yes, please describe: _____
    _____
    _____

19. Do you have any pets? [ ] Yes [ ] No
    If yes, type and amount of each: _____
    Are they: [ ] Indoor [ ] Outdoor [ ] Both

20. Do your neighbors have any pets that come into your yard? [ ] Yes [ ] No
    If yes, type and amount of each: _____

21. If you provide specific housing/habitat for wildlife have you observed it/them being used? [ ] Yes [ ] No
    If yes, by what?_____
    Consistently? [ ] Yes [ ] No
    If yes, for how long?_____

22. Why did you chose to live in this house? (check all that apply)
    [ ] Location [ ] Like the house [ ] View [ ] Yard [ ] Other_____

23. How familiar are you with different types of wildlife that are in your yard?
    [ ] Very familiar [ ] Somewhat familiar [ ] Not familiar at all
    Can you name some species that come into your yard? (If you keep a list, can we have a copy?)
    _____ _____
    _____ _____
    _____ _____
    _____ _____

How familiar are you with the different types of plants in your yard?
[ ] Very familiar [ ] Somewhat familiar [ ] Not familiar at all
Can you name some of the species in your yard (if you keep a list, can we have a copy)?
_____ _____
_____ _____
_____ _____
_____ _____

24. How would you describe your relationship to the place you live—your home, your neighborhood, your city?
    _____
    _____
    _____
    _____

25. How has having a backyard affected your decision to stay in the city?

_____

_____

_____

26. Backyard Wildlife Sanctuary participants: When did you join BWS and what was your motivation to do so?

_____

_____

_____

VEGETATION DATA SHEET

Date_____ **Crew Initials**_____
Site ID#_____

Photo #s_____

Yard length_____ Yard Width_____

Do a quick survey of the entire yard, recording the following things:

DEAD WOOD

Snags (Est. Ht./DBH) Category of decay # Snags_____

Logs >6" (Length/Diameter) Category of decay #Root wads _____

Stumps (Height/Diameter) Category of decay #Stumps _____

MAMMALS ACTIVE WITHIN SITE DURING SURVEY

Dogs _____ Cats _____
People_____ Other_____

SUPPLEMENTS

Houses

Water features

Feeders
(note what KIND and count)

HUMAN ACTIVITY OBSERVATIONS

Sketch of yard with dimensions and notable structures

OVERSTORY % COVER (W/MOOSEHORN)

Strata _____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

Appendix 2

VEGETATION SAMPLING PROTOCOL

Photos: Photo number and direction of photos.
 # Snag: Count the number of snags in the yard. A snag is classified as anything naturally broken off (not cut) and large enough that any type of bird or mammal might use it.
 # Root Wads: Count the number of root wads in the yard
Logs: Measure the length and the diameter of logs greater than 5ft long and 6 inches in diameter. Report the length first and diameter second. Length should be rounded to nearest foot.
Stumps: Measure the height/diameter of stumps. Stumps can be defined as anything that was cut. Height should be reported before diameter of stump. Heights are rounded to nearest half foot.
Category of Decay: 1,2, or 3.
Mammal Activity: Mammals active within yard. Number of people, cats and dogs or other.
Human Activity: Indicators of human activities such as sitting benches, play equipment, woodworking equipment, etc.

Supplements (Characterize, count, and note location on sketch of yard**)**
Houses: Number of houses (bird, butterflies, bats, bees).
Water features: Number of water features (pools, fountains, bird baths, etc.).
Feeders: Number of feeders in yard.
Sketch of yard: Create a rough sketch of the yard noting shape, size dimensions and any significant features. Sketch their location and rough size.

Overstory % Cover: Using moosehorn, record the number of intersections covered by vegetation in each of the 4 directions (once per strata if >1)
Overstory: Any tree >5" DBH.
% Total Cover: Percent of the entire yard covered by shrub or ground cover.
Ground layer: Anything herbaceous
Count: # of each species in yard.
% Cover: Estimated percent of yard covered by each species.
Shrub: Anything <5" DBH and woody in nature including Oregon grape, trailing blackberry, and salal to small trees.

Record the following information about EVERY tree in the yard:

OVERSTORY (Woody and greater than 5" DBH)

Genus species	Est. Ht.	DBH

Choose a circular plot with a diameter of 26.8ft, and record the following within the plot. Be sure to note photo number of any unknown species and record percent cover.

GROUND LAYER (Herbaceous)

% Cover_____

Genus species		% Cover	

(Ground layer continued)

Genus species		% Cover	

SHRUB LAYER (Woody and less than 5" DBH)

%Cover_____

Genus species		% Cover	

Total % Cover (GROUND LAYER + SHRUB LAYER, max = 100)_____